

PATENT CLAIMS

1. A process for the manufacture of the optical compensation polymer layer for the LC optical light shutter, which has the optical axis perpendicular to its surface, characterized in that it utilizes the mechanical strains resulting from the shrinking of the polymer during the polymerization process, while in contact with at least one rigid boundary surface, but preferably between two rigid boundary surfaces in such a way,

- that the monomer or prepolymer mass is poured as a layer between the two rigid surfaces separated by soft spacers, which are deformed under pressure generated in the layer as a result of the shrinkage during the polymerization, in such a way, that the mechanical strains in the direction perpendicular to the surface are significantly smaller than within the plane of the polymer layer, or
- that the monomer or prepolymer mass is poured between the two rigid surfaces divided by the hard spacers, and the polymerization process of the prepolymer mass in contact with the two rigid boundary surfaces proceeds to the level only, at which the viscosity of the mass is increased to the point, where it does not leak out, followed by the removal of the hard spacers, and the polymerization process proceeds to the end in such a way, that the polymer layer is capable of unrestrained shrinking in the direction perpendicular to the layer during further polymerization.

2. A process for the manufacture of the optical compensation polymer layer for the LC optical light shutter according to claim 1, characterized in that the polymerization is thermally activated at a temperature which is somewhat lower than the glass phase transition of the polymer, and that the achieved optical birefringence can be optically adequately reduced by reheating the polymer layer close to the temperature of the glass phase transition of the polymer.

3. A process for the manufacture of the optical compensation polymer layer for the LC optical light shutter according to claim 1, characterized in that the polymerization is activated at least at the beginning by means of UV light.

4. A process for the manufacture of the optical compensation polymer layer for the LC optical light shutter according to claims 1 and 3, characterized in that the polymerization takes place at an elevated temperature, which is lower than the temperature of the glass phase transition of the polymer used.

5. A process for the manufacture of the optical compensation polymer layer for the LCD optical light shutter according to claims 1, 3 and 4, characterized in that the activation of the polymerization by means of UV light (6) takes place in two stages, so that in the first stage - when the thickness of the layer is determined by the hard spacers (5) - it proceeds only to the level at which the increased viscosity stabilizes the thickness of the layer (3), to the point at which the hard spacers can be removed, and so the next phase of the UV activated polymerization enables the polymerization to proceed to the end almost without mechanical strains in the direction perpendicular to the compensation polymer layer (3).

6. The construction of a LC optical light shutter, characterized in that at least one of the polarizers (12, 15) is directly laminated by means of the isotropic contact adhesive to the outside protective surface (2) of the light shutter instead of directly to the LC cell (13), so that there is a polymer layer (3) between at least one of the polarizers (12,15) and between one of the boundary surfaces of the LC shutter, polymerized in such a manner that it simultaneously performs the function of combining the subcomponents of the LC shutter into a functional unity, while at the same time ensuring the angular compensation of the LC shutter in the state in which the molecules are homeotropically oriented with respect to the boundary surfaces of the LC cells (13).

7. The construction of a LC optical light shutter, characterized in that the negatively birefringent polymer layer (3) is deposited on one of the boundary surfaces of the LC cell (13), so that said polymer layer (3) is sandwiched between the surface of the LC cell (13) and the rigid transparent, preferably glass plate (18), and that there are two crossed polarizers (12,15) laminated by means of an isotropic optical adhesive (17) on each of the boundary surfaces of such assembly, and the protective outer glass (2) and IR/UV filter (11) can be optionally laminated to the outer surfaces of said crossed polarizers by means of an isotropic optical adhesive.

8. The construction of a LC optical light shutter with the use of an optically negatively birefringent polymer adhesive layer (3), and an additional optically birefringent layer between one of the polarizers and the LC cell, the thickness of said polymer corresponding to the requirement for the $\lambda/4$ plate (19) for the specified spectral domain of the employed LC optical light shutter, and the slow axis of which is parallel to the polarization (transmission) axis of the polarizer/analyzer (15), characterized in that it uses an additional color light filter (11), which preferably selectively reflects/absorbs IR/UV light, and at the same time additionally limits the amplitude of the transmitted visible light to the spectral domain of the highest sensitivity of the human eye, and the thickness (L) of the negatively birefringent layer of the optical polymer adhesive layer (3) is such that the difference between the refractive indices for the ordinary and the extraordinary rays (Δn) is such that the difference of the optical path for the ordinary and the extraordinary rays ($\Delta n_L \times L$) is smaller than the difference of the optical paths for the ordinary and the extraordinary rays in the LC cell with homeotropically oriented molecules ($\Delta n_{LC} \times d_{LC}$), in such a way, that with the negatively birefringent layer of the optical polymer adhesive layer (3), and optically negative birefringence of the polarizer (12), the optically uncompensated part of the LC layer in the LC cell (13) operates as an optically positively birefringent plate, the optical axis of which is perpendicular to the axis of the $\lambda/4$ plate (19), while the difference of the

optical paths in this part of the layer is such that together with the $\lambda/4$ plate (19) it ensures the angular compensation of the crossed polarizers of the LC light shutter.

9. The construction of a LC optical light shutter with the use of an optically negatively birefringent polymer adhesive layer (3), and an additional optically birefringent layer between the polarizers and the LC cell, the thickness of said layer corresponding to the requirement for the $\lambda/4$ plate (19) for the specified spectral domain of the utilization of the LC optical light shutter, the slow axis of which is parallel to the polarization (transmission) axis of the polarizer/analyzer (15), characterized in that it employs an additional color light filter (11), which preferably selectively reflects/absorbs IR/UV light, and at the same time additionally limits the amplitude of the transmitted visible light to the spectral domain of the highest sensitivity of the human eye, and the thickness (L) of the optically negatively birefringent layer of the optical polymer adhesive layer (3) is such that the difference of the optical paths for the ordinary and the extraordinary rays ($\Delta n_L \times L$) is greater than the difference of the optical paths for the ordinary and the extraordinary rays in the LC cell (13) with homeotropically oriented molecules ($\Delta n_{LC} \times d_{LC}$) in such a way, that with the LC layer and optically negative birefringence of the polarizer (12), the optically uncompensated part of the negatively birefringent layer of the optical adhesive layer (3) works as a negatively birefringent plate, the optical axis of which is perpendicular to the axis of the $\lambda/4$ plate (19), while the difference of the optical paths in this part of the layer is such that together with the $\lambda/4$ plate (19) it ensures the angular compensation of the light extinction in the crossed polarizers (12,15) of the LC light shutter.